

**Abstract of Disclosure:**

A probe for friction stir welding MMCs, ferrous alloys, non-ferrous alloys, and superalloys, as well as non-ferrous alloys, the probe including a shank, a shoulder, and a pin disposed through the shoulder and into the shank, wherein the pin and the shoulder at least include a coating comprised of a superabrasive material, the pin and shoulder being designed to reduce stress risers, disposing a collar around a portion of the shoulder and the shank to thereby prevent movement of the shoulder relative to the shank, and incorporating thermal management by providing a thermal flow barrier between the shoulder and the shank, and between the collar and the tool.

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